

PRELIMINARY AMENDMENT & RESPONSE

Serial Number: 08/636,069

Filing Date: April 22, 1996

Title: METHOD TO REDUCE FIXED CHARGE IN CVD OZONE DEPOSITED FILMS

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*Exposed*

exposing a reaction volume of gases above the substrate surface to a high intensity light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

- Dist. F3*
31. (Twice amended) A method of depositing a silicon dioxide layer on a substrate surface, comprising:
- contacting the substrate surface with a reaction volume of gas comprising a  $\text{SiO}_2$  precursor and ozone;
- heating the substrate surface to a temperature of [about] at least 480°C to about 700°C;
- and
- illuminating the reaction volume of gas from a light source without directly exposing the substrate surface to the light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

- Dist. F3*
42. (Twice amended) A method of depositing a doped silicon dioxide layer on a substrate surface, comprising:
- contacting the substrate surface with a reaction volume of gas comprising a  $\text{SiO}_2$  precursor, ozone and at least one dopant source;
- heating the substrate surface to a temperature of [about] at least 480°C to about 700°C;
- and
- illuminating the reaction volume of gas from a light source without directly exposing the substrate surface to the light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

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43. (Once amended) A method of depositing a doped silicon dioxide layer on a substrate surface, comprising:  
contacting the substrate surface with a reaction volume of gas comprising a SiO<sub>2</sub> precursor, ozone and at least two dopant sources; [and]  
heating the substrate surface to a temperature of at least 480°C to about 700°C; and  
illuminating the reaction volume of gas from a light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.
45. (Once amended) A method of depositing a borophosphosilicate glass layer on a substrate surface, comprising:  
heating the substrate surface to a temperature of at least 480°C to about 700°C;  
contacting the substrate surface with a reaction volume of gas, wherein the reaction volume of gas comprises:  
a SiO<sub>2</sub> precursor selected from the group consisting of TEOS (tetraethylorthosilicate), TMCTS (tetramethylcyclotetrasiloxane), DES (diethylsilane), DTBS (ditertiarybutylsilane) and TMOS (tetramethylorthosilicate);  
a dopant source for boron selected from the group consisting of triisopropylborate, TMB (trimethylborate), and TEB (triethylborate); and  
a dopant source for phosphorus selected from the group consisting of TEPo (triethylphosphate), TEPi (triethylphosphite), TMPo (trimethylphosphate) and TMPi (trimethylphosphite); and  
illuminating the reaction volume of gas from a high intensity light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

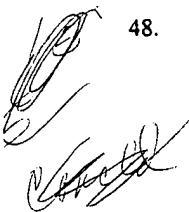
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46. (Once amended) A method of depositing a fluorosilicate glass layer on a substrate surface, comprising:  
heating the substrate surface to a temperature of at least 480°C to about 700°C;  
contacting the substrate surface with a reaction volume of gas comprising a fluorinated SiO<sub>2</sub> precursor and ozone; and  
illuminating the reaction volume of gas from a light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.
47. (Once amended) A method of depositing a doped fluorosilicate glass layer on a substrate surface, comprising:  
heating the substrate surface to a temperature of at least 480°C to about 700°C;  
contacting the substrate surface with a reaction volume of gas comprising a fluorinated SiO<sub>2</sub> precursor, ozone and at least one dopant source; and  
illuminating the reaction volume of gas from a light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.
-  48. (Once amended) A method of depositing a doped fluorosilicate glass layer on a substrate surface, comprising:  
heating the substrate surface to a temperature of at least 480°C to about 700°C;  
contacting the substrate surface with a reaction volume of gas comprising a fluorinated SiO<sub>2</sub> precursor, ozone and at least two dopant sources; and  
illuminating the reaction volume of gas from a high-intensity light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

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50. (Once amended) A method of depositing a fluoroborophosphosilicate glass layer on a substrate surface, comprising:  
heating the substrate surface to a temperature of at least 480°C to about 700°C;  
contacting the substrate surface with a reaction volume of gas, wherein the reaction volume of gas comprises:  
a SiO<sub>2</sub> precursor comprising FTES (fluorotriethoxysilane);  
a dopant source for boron selected from the group consisting of triisopropylborate, TMB (trimethylborate), and TEB (triethylborate); and  
a dopant source for phosphorus selected from the group consisting of TEPO (triethylphosphate), TEPI (triethylphosphite), TMPo (trimethylphosphate) and TMPi (trimethylphosphite); and  
illuminating the reaction volume of gas from a high intensity light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

51. (Twice amended) A method of depositing a silicon dioxide layer on a substrate surface, comprising:  
contacting the substrate surface with a reaction volume of gas comprising a SiO<sub>2</sub> precursor and ozone;  
heating the substrate surface to a temperature of [about] at least 480°C to about 700°C;  
and  
illuminating the reaction volume of gas from a light source comprising mercury arc vapor lamps without directly exposing the substrate surface to the light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

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52. (Twice amended) A method of depositing a doped silicon dioxide layer on a substrate surface, comprising:  
contacting the substrate surface with a reaction volume of gas comprising a  $\text{SiO}_2$  precursor, ozone and at least one dopant source;  
heating the substrate surface to a temperature of [about] at least 480°C to about 700°C;  
and  
illuminating the reaction volume of gas from a light source comprising mercury arc vapor lamps without directly exposing the substrate surface to the light source to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.

53. (Once amended) A method of depositing a doped silicon dioxide layer on a substrate surface, comprising:  
heating the substrate surface to a temperature of at least 480°C to about 700°C;  
contacting the substrate surface with a reaction volume of gas comprising a  $\text{SiO}_2$  precursor, ozone and at least two dopant sources; and  
illuminating the reaction volume of gas from a light source comprising mercury arc vapor lamps to increase the functional atomic oxygen concentration and reduce the fixed charge in the deposited films.